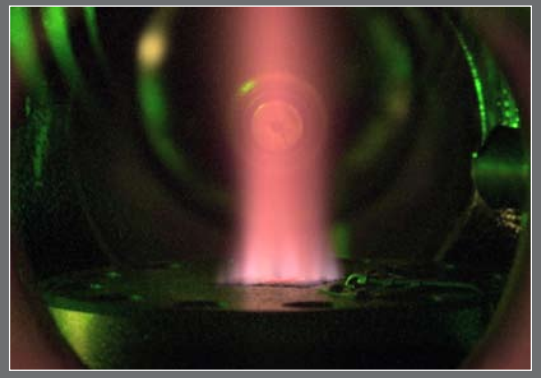
High-temperature coating allows upper temperature limit to 2200 °F.



Spontaneous Raman scattering laser diagnostic development.

High-pressure premixed calibration burner.

General Information

NASA Glenn Research Center
www.nasa.gov/centers/glenn/home/

Glenn Test Facilities Guide
http://facilities.grc.nasa.gov/documents/facilities_Booklet_2005.pdf

Glenn Research Center Resume
www.nasa.gov/centers/glenn/about/

Business Development and Partnership
http://newbusiness.grc.nasa.gov

Ceramic matrix composite vane with environmental barrier coating.

Business Development and Partnership Office

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Fax: 216–977–7133
E-mail: Robert.J.Shaw@nasa.gov

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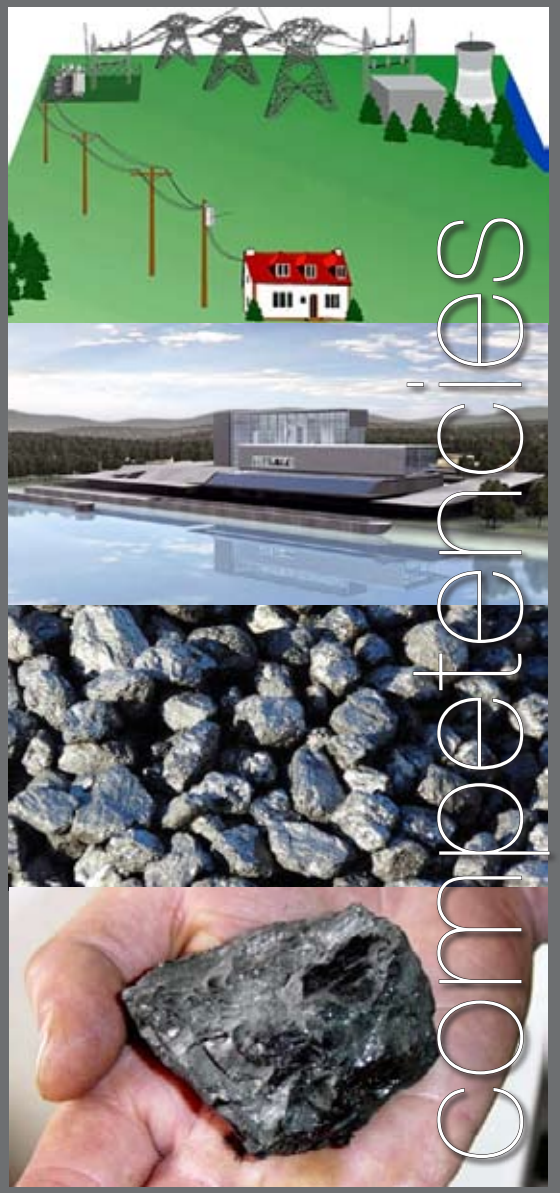
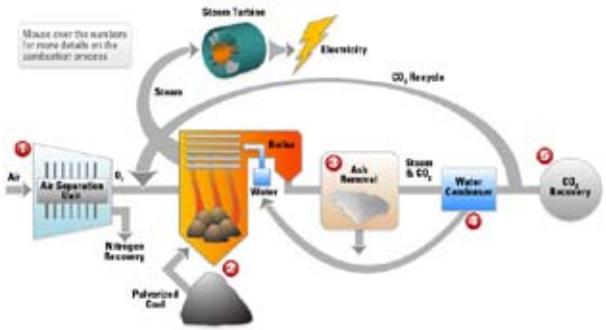
National Aeronautics and Space Administration

Clean Coal



Clean Coal Processing



http://www.sandia.gov/news/resources/graphics-gallery/
Image credit: Sandia National Laboratories

Glenn competencies are well aligned with technologies for generating and distributing electricity from coal.

Combustion
The research is focused on providing improved understanding of combustion processes to include the chemical kinetics of reacting flows, heat transfer phenomena, flow physics modeling, and code development and verification. Advanced computational methods are applied to unique concepts to assess their potential. Advanced high-temperature materials, unique fuels, and low-NOx combustion systems are assessed.

Electrical Systems
One objective of this competency is the innovative integration of diverse, state-of-the-art power devices in an optimal configuration for space and terrestrial applications. The appropriate application and control of the various power devices significantly improves overall devices including ultra-capacitors and photovoltaics, which have extremely wide potential with applications from nanowatts to megawatts. Applications include power generation, transportation systems, biotechnology systems, and space power systems.

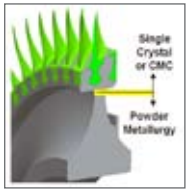
Clean Coal Competencies

Electrochemistry (Fuel Cells)
This competency addresses advanced electrochemical power generation and energy storage devices. It is focused on fuel cell, regenerative fuel cells (fuel cell + electrolysis cell), and batteries. It encompasses materials development and evaluation, cell component development and optimization, stack and battery technology, and specific energy, energy density, performance, and life. Capabilities also include design and performance modeling and technology specification and validations.

Fluids (CFD)
Computational fluid dynamic codes are developed, maintained, and applied to design advanced turbomachinery, predict turbomachinery performance, understand steady and unsteady flow phenomena, investigate new concepts for improving the performance or stability, and predict the effects of advanced cooling configurations.

Instrumentation and Controls
This research in harsh environment sensors, high-power electronics, micro/nanoelectromechanical systems, high data rate optical instrumentation, and active and intelligent controls enables self-feeling, self-thinking, self-reconfiguring, and self-healing systems. It is responsible for conducting and directing basic and applied research advanced instrumentation controls technologies for propulsion and power applications.

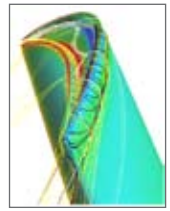
Materials
This competency develops processes and characterizes materials for aerospace applications. Metallic, ceramic, and polymeric materials are the current focus, both monolithic and composites.
It is possible to enable and extend component durability by understanding, developing and demonstrating the feasibility and viability of advanced coatings. Appropriate life prediction techniques are used to determine component life.



Mechancial and Components
Component fatigue testing enables the development of advanced materials processing and coatings for gears, bearings, and seals. Advanced lubrication technology enables high-speed gear systems. Systems testing of advanced components and analytical tool development for condition-based maintenance of mechanical structures is another capability. Research elements include advanced mechanical drive system concepts, gear dynamics and durability, oil-free turbomachinery, and highly efficient turbine, thermal barrier, and structural seals.

Program/Project Management
The ~100 project and program managers at Glenn have experience in managing 119 Centaur rocket launches, the Space Station Freedom power system, ARES launch vehicle systems, as well as numerous electric propulsion, communications, aeropropulsion, and microgravity projects.

Modeling and Simulation
Design and modeling identify systems as well as components. Virtual reality techniques support the design of new technologies. Simulation of environments provides testing for systems and components.



Structures
This goal of this competency is to study and model fluid structures interactions and to predict and verify structural dynamic responses, loads, vibration, and shock environments for aerospace structures.

Systems Analysis and Engineering
This competency focuses on using tools to analyze aerospace vehicles, propulsion, and power concepts. It is focused on the development and maintenance of systems engineering processes and the applications of engineering processes at a systems level.

Turbomachinery
This competency conducts fundamental and applied research to advance the state of art in turbomachinery and heat transfer for aerospace applications. The research is applicable to civil and military aircraft, industrial engines, and space vehicles. It has been applied to such diverse applications as automotive fans, vacuum cleaner impellers, and jet ski impellers.